EID Parry (India) Limited

UNFCCC Ref No: 1139

Project title: Bagasse based Cogeneration Project at Pudukottai Tamil Nadu, India

Clean Development Mechanism
Revision in Registered Monitoring Plan

A Murugappa Group Company

10 June 2010

Purpose:

The purpose of this "revision in monitoring plan" is to modify the registered monitoring plan in accordance with the monitoring methodology "approved consolidated baseline and monitoring methodology ACM0006 - version 04".

Some monitoring parameters which were left out in the registered PDD (Version 04 dated 02/07/2007) are now being included through this revision in monitoring plan. This revision also seeks to clarify the monitoring procedures of certain parameters existing in the PDD. However, all the parameters are already being monitored by the PP in accordance to the methodology.

B.7 Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	**$BF_{k,y}$**
Data unit:	Tonnes of dry matter
Description:	Quantity of biomass type *k* combusted in the project plant during year y
Source of data to be used:	EID Parry fuel log books
Value of data applied for the purpose of calculating expected emission reductions in section B.5	310,800
Description of measurement methods and procedures to be applied:	Fuel consumption will be measured continuously in on-line weighing scale installed in the fuel conveyors. This data is recorded on a daily basis by Engineer (Mechanical) in fuel log books. Reporting and archiving: Data recorded by Engineer is reviewed and input to the computer by the Shift-in-charge. On a monthly basis, a compilation of all the Energy-CDM parameters recorded for the month would be prepared by the Shift-in-charge and submitted to the Cogen head. The Cogen head would verify the monthly energy-CDM report and archive it. This gives the wet fuel quantity. The dry fuel quantity is calculated by adjusting for the moisture content as follows: Dry fuel = Wet fuel * (100- moisture %) Monitoring frequency: Continuously
QA/QC procedures to be applied:	The measured values will be cross-checked for consistency with an annual fuel balance based on monthly/annual manufacturing reports, purchase receipts and stock exchanges as "Fuel combusted = Fuel generated in-house + Fuel purchased + Opening stock -

	Closing stock in fuel yard" Calibration: Online weighing scale will be calibrated once in six months.
Any comment:	Purchased biomass, if, any, will be metered separately under this parameter for calculation of project emissions from biomass transportation.

Data / Parameter:	**Moisture content of biomass residues**
Data unit:	% water content
Description:	Moisture content of biomass residue type k
Source of data to be used:	EID Parry log books and monthly manufacturing reports
Value of data applied for the purpose of calculating expected emission reductions in section B.5	50 %
Description of measurement methods and procedures to be applied:	The moisture content will be measured on-site using the "weights method" described below and recorded in log books and electronic records. Weights method: The weight of fuel with moisture and without moisture (after drying in oven) is measured to arrive at the moisture content. This data will be recorded on a daily basis by Engineer (Mechanical) in log books. Reporting and archiving: Data recorded by Engineer is reviewed and input to the computer by the Shift-in-charge. On a monthly basis, a compilation of all the Energy-CDM parameters recorded for the month would be prepared by the Shift-in-charge and submitted to the Cogen head. Mean values are calculated monthly and recorded in monthly manufacturing reports called as RT 7c. The Cogen head would verify the monthly energy-CDM report and archive it.
QA/QC procedures to be applied:	The mass balance will be calibrated once in a year.
Any comment:	--

Data / Parameter:	**AVD_v**
Data unit:	Kilometres (Kms)
Description:	Average round trip distance (from and to) between biomass fuel supply sites and the project site
Source of data to be used:	Records of EID Parry on the origin of the biomass residues and distance provided by truck operators
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100
Description of measurement methods and procedures to be applied:	Origin of the biomass residues for each truck trip will be recorded by the stores department. Monitoring frequency: Continuously The truck operator will provide the distance travelled by the truck between the fuel

	supply site and the project activity. Data provided by truck operator will be reviewed and archived by the Cogen head.
QA/QC procedures to be applied:	Consistency of distance records provided by the truckers will be checked by the project promoters using their own vehicles. Reference will be trip sheets of own vehicles
Any comment:	This data is used to calculate project emissions from biomass transportation. The biomass will be sourced from different sites; the mean value of the round trip distance based on the number of sites will be adopted for calculation as per the methodology.

Data / Parameter:	TLy
Data unit:	Tonnes
Description:	Average truck load of the trucks used for transportation of biomass
Source of data to be used:	EID Parry
Value of data applied for the purpose of calculating expected emission reductions in section B.5	10
Description of measurement methods and procedures to be applied:	Average carrying capacity of trucks
QA/QC procedures to be applied:	Weigh bridges used for measuring the truck loads will be calibrated periodically
Any comment:	This data is used to calculate project emissions from biomass transportation

Data / Parameter:	**$EF_{km, CO2}$**
Data unit:	t CO_2/km
Description:	Average CO_2 emission factor for transportation of biomass with trucks
Source of data to be used:	Conduct sample measurements of the fuel type, fuel consumption and distance traveled for all truck types. Calculate CO2 emissions from fuel consumption by multiplying with appropriate density values, appropriate net calorific values and CO2 emission factors. EID Parry truck fuel economy measurement records. For density, default values from Bureau of Energy Efficiency (BEE, reliable national default values) will be applied. For NCV, default values from Central Electricity Authority of India (CEA, reliable national default values) will be applied. For CO2 emission factors, IPCC default values will be applied.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.6478
Description of measurement methods and procedures to be applied:	Sample measurements will be conducted to determine the fuel efficiency (kms/litre fuel) of the trucks by monitoring the fuel type, fuel consumption and distance travelled for all truck types. From the fuel efficiency, fuel consumption per kilometre distance travelled (litre fuel/km) is calculated and multiplied with density of fuel (kg/litre) to arrive at fuel

	consumed per kilometre distance travelled (Tonne fuel/km). The tonne of fuel consumed per km distance travelled will be multiplied with the net calorific value of diesel (based on Central Electricity Authority data) and its CO2 emission factor (IPCC default values) to arrive at CO_2 emission factor for transportation of biomass with trucks (tCO_2/km). $$= \frac{GJ}{Tonne of\ fuel} \ X \ \frac{tCO_2}{TJ} \ X \frac{Tonne\ of\ fuel}{km} \ X \ \frac{1\ TJ}{1000\ GJ} = \frac{tCO_2}{km}$$ Monitoring frequency: Annually
QA/QC procedures to be applied:	Values arrived will be checked for consistency with national / international default values. Check consistency of measurements and local / national data with default values by the IPCC. If the values differ significantly from IPCC default values, possibly collect additional information or conduct measurements.
Any comment:	--

Data / Parameter:	**$EF_{CO2,FF,i}$**
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor for fossil fuel type i
Source of data to be used:	In case of lignite, CO_2 emission factor would be based on India's National Communication to the UNFCCC In case of coal and diesel oil, default values as per latest IPCC guidelines
Value of data applied for the purpose of calculating expected emission reductions in section B.5	- (No fossil fuel consumption expected during normal operation. Envisaged only during emergencies. Actual value would be adopted based on the type of fuel used) Fuel Type / CO_2 emission factor tCO_2/TJ / Source Lignite / 106.1 / India's National Communication to the UNFCCC Coal / 96.1 / IPCC guidelines Diesel / 74.1 / IPCC guidelines
Description of measurement methods and procedures to be applied:	For lignite, default value provided in India's National Communication to the UNFCCC will be adopted For coal and diesel oil, the default value provided in latest IPCC guidelines will be adopted. Monitoring frequency: Appropriateness and conservativeness of the default value from latest IPCC guidelines and India's National Communication to the UNFCCC will be reviewed annually and the most conservative value will be adopted in the project activity.
QA/QC procedures applied	QA/QC procedure is not applied as default value from IPCC guidelines and India's National Communication to the UNFCCC will be adopted.
Any comment:	Conservative CO_2 emission factors data between the India's first National Communication to UNFCCC and IPCC default has been adopted for Lignite, coal and diesel oil used in the project activity.

Data / Parameter:	**$FF_{project\ plant\ i,y}$**
Data unit:	Tonnes
Description:	Quantity of fossil fuel type i combusted in the project plant during year y
Source of data to be used:	On-site measurements recorded in EID Parry fuel log books
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0 (No fossil fuel consumption expected during normal operation)
Description of measurement methods and procedures to be applied:	Fuel consumption will be measured continuously in on-line weighing scale installed in the fuel conveyors. This data will be recorded on a daily basis by Engineer (Mechanical) in fuel log books. Reporting and archiving: Data recorded by Engineer will be reviewed and input to the computer by the Shift-in-charge. On a monthly basis, a compilation of all the Energy-CDM parameters recorded for the month would be prepared by the Shift-in-charge and submitted to the Cogen head. The Cogen head would verify the monthly energy-CDM report and archive it. Monitoring frequency: Continuously
QA/QC procedures to be applied:	The measured values will be cross-checked for consistency with an annual fuel balance based on purchased quantities and stock exchanges as "Fuel combusted = Fuel purchased + Opening stock - Closing stock in fuel yard" Calibration: Online weighing scale will be calibrated once in six months
Any comment:	--

Data / Parameter:	**$FF_{project\ site,\ i,y}$**
Data unit:	Tonnes
Description:	Quantity of fossil fuel type i combusted at the project site for other purposes that are attributable to the project activity during the year y.
Source of data to be used:	On-site measurements recorded in EID Parry log books
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0 (No fossil fuel consumption expected during normal operation)
Description of measurement methods and procedures to be applied:	The quantity of fossil fuel consumed, if any will be measured using the volume or weight meters. The measured qty of fuel is recorded in log books on a daily basis by the Engineer (Mechanical). Reporting and archiving: Data recorded by Engineer is reviewed and input to the computer by the Shift-in-charge. On a monthly basis, a compilation of all the Energy-CDM parameters recorded for the month would be prepared by the Shift-in-charge and submitted to the Cogen head. The Cogen head would verify the monthly energy-CDM report and archive it. Monitoring frequency: Continuously

QA/QC procedures to be applied:	The measured values will be cross-checked for consistency with an annual fuel balance based on purchased quantities and stock exchanges as "Fuel consumed = Fuel purchased + Opening stock - Closing stock"
Any comment:	

Data / Parameter:	**$EG_{project\ plant,y}$**
Data unit:	MWh
Description:	Net quantity of electricity generated in the project plant during the year y
Source of data to be used:	Based on on-site measurements recorded in EID Parry log books
Value of data applied for the purpose of calculating expected emission reductions in section B.5	131,900
Description of measurement methods and procedures to be applied:	The gross electricity generation and auxiliary consumption are monitored in energy meters. The net electricity generation is calculated by deducting the auxiliary consumption from the gross electricity generation. $EG_{project\ plant} = EG_{gross} - EG_{Aux}$. The Technician (Electrical) records the net generation data on a daily basis in log books. $EG_{gross,projectplant,y}$ is monitored continuously in a gross energy meter. $EG_{Aux,projectplant,y}$ is monitored continuously in three auxiliary energy meters. The auxiliary equipments are supplied through two transformers (called DTR and CTR) during normal operation. During emergency, the equipments are also supplied from the DG set. The energy supply through all the three sources is monitored through three energy meters, which is summed up to calculate the total auxiliary consumption. $EG_{Aux,projectplant,y} = EG_{Aux,\ DTR} + EG_{Aux,\ CTR} + EG_{DG}$ Reporting and archiving: The Engineer (Electrical) reviews and approves the log books on a daily basis and record the data in computer. On a monthly basis, a compilation of all the energy parameters recorded for the month is prepared by the Engineer and submitted to the Cogen head. The Cogen head verifies the monthly energy report and archives it. Monitoring frequency: Continuously
QA/QC procedures to be applied:	An annual energy balance would be done by the Cogen head to cross-check the recorded generation data with receipts from electricity exported and sold to TNEB.

Any comment:	-

Data / Parameter:	$Q_{project\ plant,y}$
Data unit:	GJ
Description:	Net quantity of heat generated from firing biomass residues in the project plant
Source of data to be used:	On-site measurements recorded in EID Parry log books
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1986437.38
Description of measurement methods and procedures to be applied:	Net heat generation is determined as the difference of the enthalpy of the steam generated by the project cogeneration plant minus the enthalpy of the feed-water and any condensate return. The respective enthalpies would be determined based on the mass (or volume) flows, the temperatures and, in case of superheated steam, the pressure. Steam tables or appropriate thermodynamic equations would be used to calculate the enthalpy as a function of temperature and pressure. The fraction of heat generated from firing biomass residues would be determined by dividing the quantity of biomass residues fired by the total quantity of all fuels fired, both expressed in energy quantities. The mass flow, temperature and pressure of steam, feed water and condensate are monitored continuously using online meters. The net heat generation is calculated as "Enthalpy of steam – Enthalpy of feed water - Enthalpy of condensate" Monitoring frequency: continuously
QA/QC procedures to be applied:	The consistency of heat generation is cross-checked with fuel consumption
Any comment:	--

Data / Parameter:	**$NCV_{i,}$**
Data unit:	GJ/Tonne
Description:	Net calorific value of fossil fuel type i
Source of data to be used:	Analysis report of third party laboratory or accurate and reliable local or national data where available. Where such data is not available, IPCC default net calorific values (country-specific, if available) will be used
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0 (No fossil fuel consumption expected during normal operation)
Description of measurement methods and procedures to be applied:	Measurements shall be carried out at reputed laboratories and according to relevant international standards Every six months, the lab technician will collect and send three samples to the third party laboratory. The analysis reports will be reviewed and archived by the Cogen head. Monitoring frequency: Third party analysis once in six months taking three samples per analysis
QA/QC procedures to be applied:	Check consistency of measurements and local / national data with default values by the IPCC. If the values differ significantly from IPCC default values, possibly

	collect additional information or conduct measurements.
Any comment:	The value will be determined when fossil fuel is used

Data / Parameter:	**NCV_k**
Data unit:	GJ/tonne of dry biomass residue
Description:	Net calorific value of biomass residue type k
Source of data to be used:	Analysis report of third party laboratory
Value of data applied for the purpose of calculating expected emission reductions in section B.5	15.07
Description of measurement methods and procedures to be applied:	The NCV is determined in calibrated calorimeters of a certified agency Every six months, the lab technician collects and sends three samples to the third party laboratory. The analysis reports are reviewed and archived by the Cogen head. Monitoring frequency: Third party analysis once in six months taking three samples per analysis
QA/QC procedures to be applied:	Check consistency of measurements and local / national data with default values by the IPCC. If the values differ significantly from IPCC default values, possibly collect additional information or conduct measurements.
Any comment:	--

Data / Parameter:	**$EC_{PJ,y}$**
Data unit:	MWh
Description:	On-site electricity consumption attributable to the project activity during the year y. The electricity import from grid and generation in the DG set are already accounted as auxiliary electricity consumption and which is deducted to arrive at the net electricity generation and therefore these would not be considered under this parameter.
Source of data to be used:	Energy meter measurements recorded in EID Parry energy meter log books
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0 (No additional electricity consumption expected during normal operation)
Description of measurement methods and procedures to be applied:	Excluding auxiliary consumption, any other electricity consumption, if any, attributable to the project activity will be measured continuously in the energy meters and recorded Reporting and archiving: The Engineer (Electrical) reviews and approves the log books on a daily basis and records the data in computer. On a monthly basis, a compilation of all the energy parameters recorded for the month is prepared by the Engineer and submitted to the Cogen head. The Cogen head verifies the monthly energy report and archive it. Monitoring frequency: Continuously
QA/QC procedures to be applied:	An annual energy balance will be carried out by the Cogen head to cross-check the recorded generation data with receipts from electricity exported and sold to TNEB.

	Calibration: Calibration of the energy meter will be performed once in a year by a third party agency and is traceable to national standards
Any comment:	--

B.7.2 Description of the monitoring plan:

>>

EID Parry will incorporate a special team for implementing the monitoring procedures as described in sections B6.2 and B7.1. The team will comprise of relevant personnel from various departments, who will be assigned the task of monitoring and recording specific CDM parameters relevant to their department. The monitored values will be periodically cross-checked by the respective department heads and sent to the CDM team head for compilation and analysis. Any deviation of monitored values from estimated values will be investigated and appropriate action would be taken. The monitored values would be recorded and stored in paper and electronically for verification. Elaborate monitoring information is provided in Annexure 4.

Annex 4

MONITORING INFORMATION

EID Parry has employed the latest and state of the art monitoring system and equipment to measure, record and report the various key CDM parameters. Monitoring methods have been designed and implemented for all the parameters (in Sections B.6.2 and B.7.1) required to calculate emission reductions, project emissions and leakage.

Functions of the CDM Team:

- Monitor parameters for calculating emission reductions generated by the project activity
- Maintain records of relevant data for verification of CERs.
- Ensure accuracy of data by proper maintenance and calibration of monitoring equipment.
- Operate the power plant in compliance with the CDM Project Design Document
- Take all preventive measures to ensure plant availability at all times.

PLANT MAINTENANCE PROCEDURE:

Maintenance procedures are adopted as below to ensure trouble free running of the plant to get optimum level of output.

- Regular Maintenance procedures
- Maintenance and breakdown reports for analysis
- Stock critical spares
- Training on equipments and instruments

Preventive and Breakdown maintenance procedures are prepared and documented for various types of equipments like Boiler, turbine, air cooled condenser, material handling conveyors, Water treatment plant, High/ low capacity motors, HT/LT panels, HT/LT Transformers, Alternator, Exciter, Control panels in the respective departments and instrumentation.

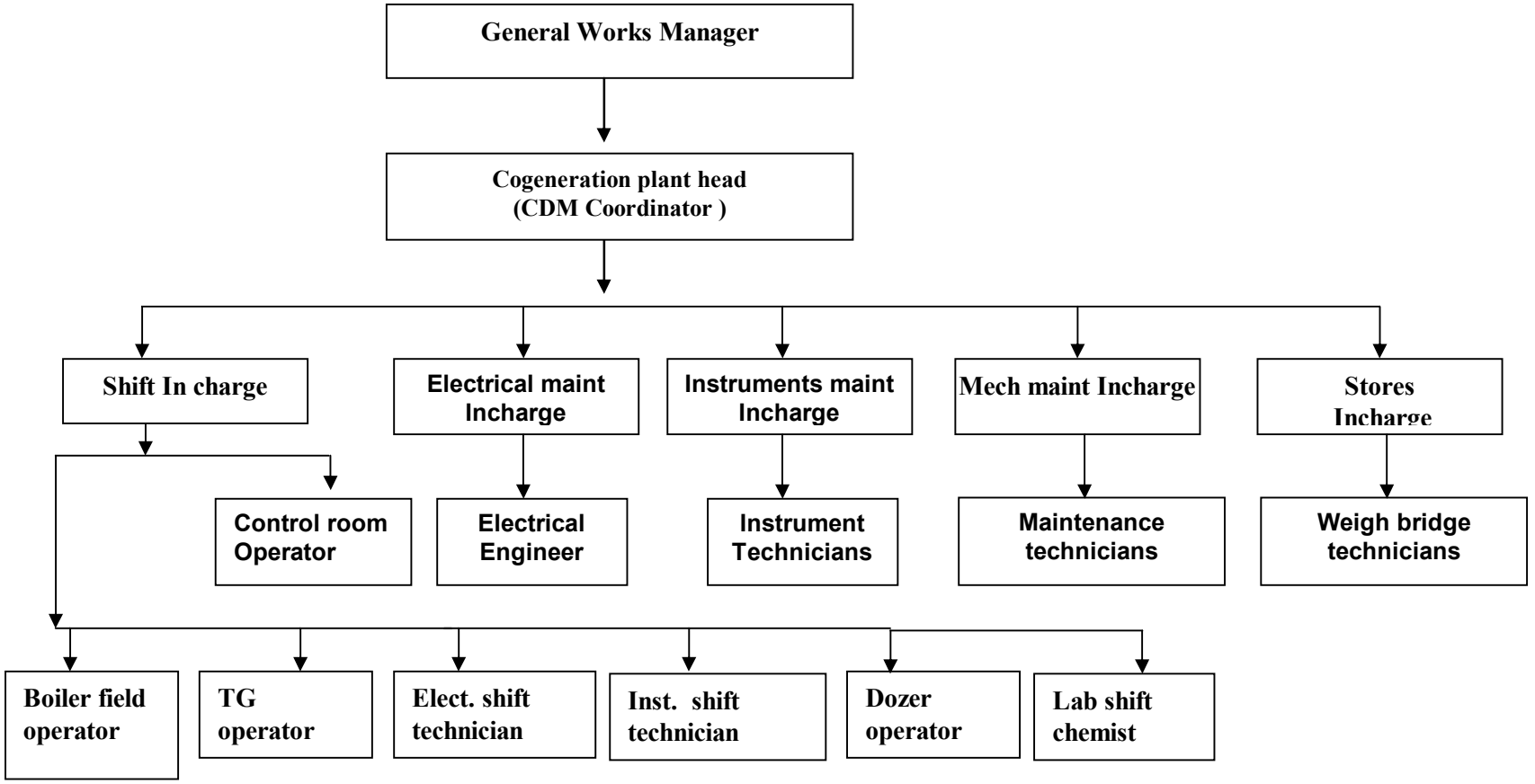
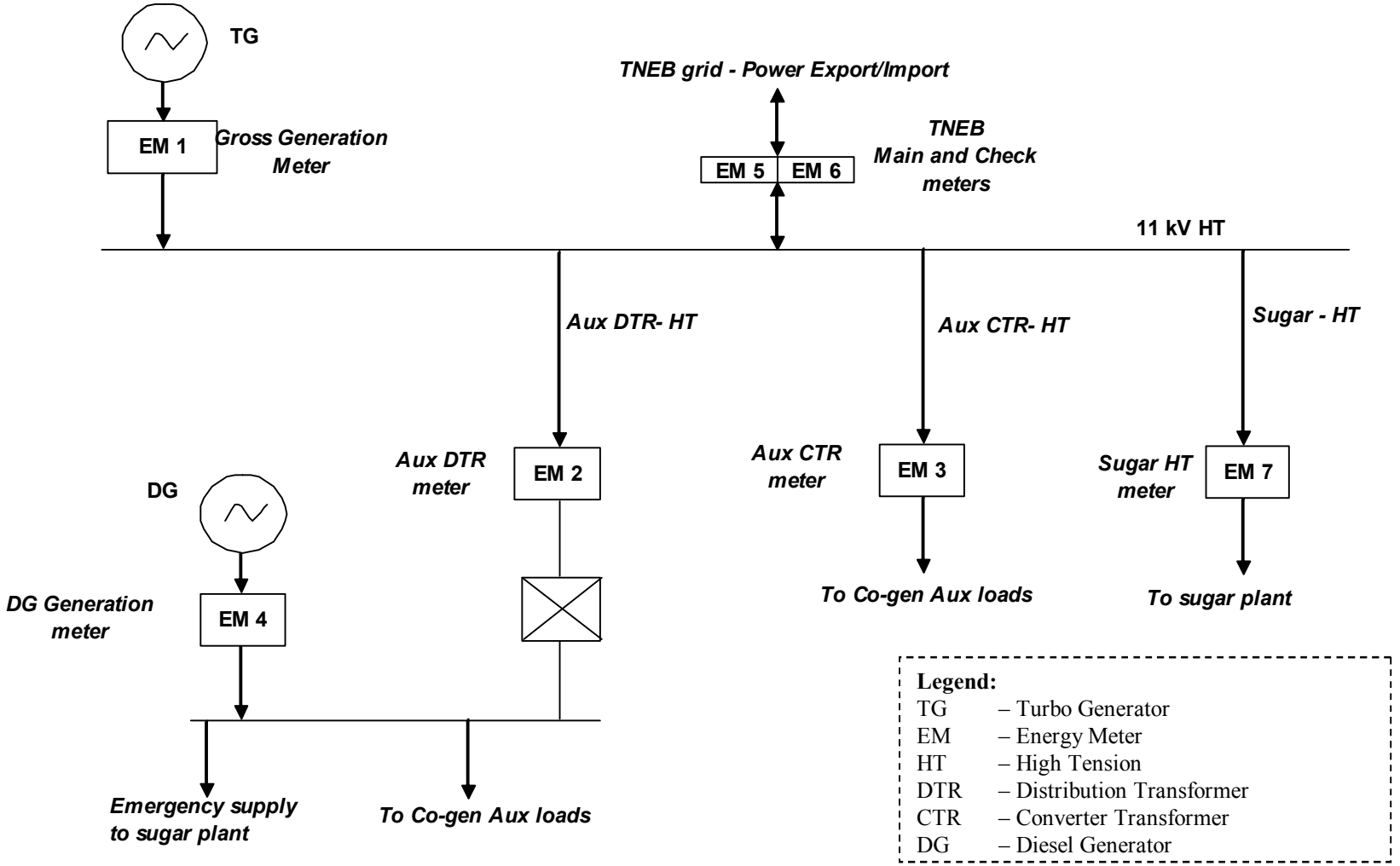


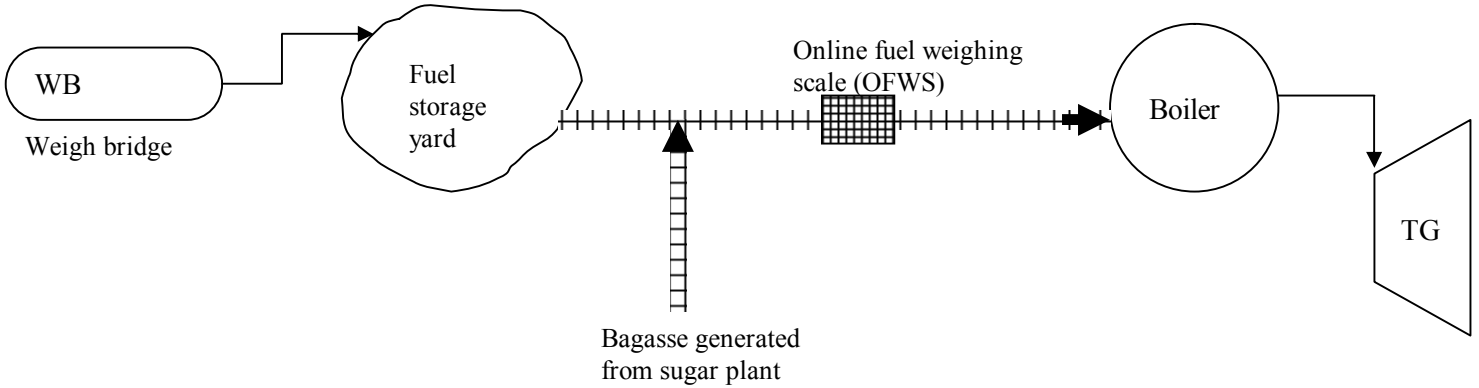
Figure: CDM Team

MONITORED PARAMETERS AND MONITORING PLAN

Electricity Monitoring Diagram:



Fuel Monitoring Diagram:



Following is the detailed list of monitoring parameters.

Data description	Unit	Instrument used	Monitg. Freq.	Procedure for monitoring the parameter	Location of instmt	Calibration Method	Calib. Freq.	Responsibility of monitoring	Resp. of data approval	Resp. of reporting & archiving	QC of data (Internal audit)
Energy Generation from 18 MW TG	MWh	Energy Meter	Daily	Recorded in EMS and log book	HT panel room	Reputed external agency	Yearly	Shift engineer	Electrical maint incharge	Cogen plant head	General works Manager
Energy Exported	MWh	Energy Meter	Monthly	Recorded in log book	TNEB Switchyard	By meter relay test wing of TNEB	Yearly	Shift engineer	Electrical maint incharge	Cogen plant head	General works Manager
Captive Energy Consumption	MWh	Energy Meter	Daily	Recorded in EMS and log book	HT panel room	Reputed external agency	Yearly	Shift engineer	Electrical maint incharge	Cogen plant head	General works Manager
Auxiliary electricity for Cogen plants	MWh	Energy Meter	Daily	Recorded in EMS and log book	HT panel room	Reputed external agency	Yearly	Shift engineer	Electrical maint incharge	Cogen plant head	General works Manager
Quantity of Bagasse Generated	Tonnes	Cane Weigh bridge, Juice and Water flow meter	Daily	Calculated based on the mass balance of cane crushed and juice flow	NA	Reputed external agency	Yearly	Control lab	Production HOD	Cogen plant head	General works Manager
Bagasse Consumed in 18 MW Plant	Tonnes	On-line fuel weighing system	Monthly	Recorded in Log book	Fuel conveyor to boiler	Internal calibration method	Six months	Boiler operator	Mech maint incharge	Cogen plant head	General works Manager
Quantity of Biomass/Bagasse Purchased from outside	Tonnes	Weigh Bridge	Monthly	Recorded in the Log book in stores	Factory entrance	Reputed external agency	Yearly	Stores incharge	NA	Cogen plant head	General works Manager

Quantity of Coal purchased	Tonnes	Weigh Bridge	Monthly	Recorded in the Log book in stores	Factory entrance	Reputed external agency	Yearly	Stores incharge	NA	Cogen plant head	General works Manager
Calorific value of bagasse	Kcal/kg	Calorimeter	Half yearly	Measured in external lab	NA	Reputed external agency	Six months	Lab incharge	NA	Cogen plant head	General works Manager
Calorific Value of Biomass	Kcal/kg	Calorimeter	Half yearly	Measured in external lab	NA	Reputed external agency	Six months	Lab incharge	NA	Cogen plant head	General works Manager
Calorific Value of Coal	Kcal/kg	Calorimeter	Half yearly	Measured in external lab	NA	Reputed external agency	Six months	Lab incharge	NA	Cogen plant head	General works Manager

Measures to ensure data accuracy / uncertainty levels:

Mass and energy balance:
The electricity parameters will be monitored and are cross-checked by doing an annual energy balance. The fuel consumption data will be cross-checked by an annual mass balance considering purchased quantities and stock exchanges.

Calibration:
All the energy meters and other monitoring equipments will be calibrated annually to ensure that the accuracy levels are maintained within their specified levels.

CDM monthly review meeting:
The CDM team will meet once in a month to review the CDM performance of the plant. Any particular concerns will be discussed and appropriate action will be taken. The CERs generated are compared with the expected CERs and corrective actions are taken.

CDM Internal audit:
An internal audit (IA) team will be formulated and will conduct the audit once in a quarter. The IA team will constitute of one site Accountant, one Mechanical Engineer, one Electrical Engineer and one Process Engineer. The team will review the monitored data and verify them for correctness. The IA team will submit a report to the Head (Cogeneration plant) who will review it and forward it to the General Works Manager.

Training:
Various members of the CDM team will be trained time to time according to the departmental needs. This will help to eliminate any manual recording or calculation errors.

Data uncertainty:
The uncertainty of the monitored data depends on the following parameters:
*Meter uncertainty***,** which is equivalent to the accuracy level of the meter. All the meters have been calibrated at least annually which ensures that the uncertainty levels are within the accuracy level.
Operator uncertainty – This is not applicable since none of the monitoring equipments need a manual operator.

All of the above will contribute to ensure the accuracy of the recorded data.